

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 03 MAY 2006

WIPO

PCT

| | | | |
|--|--|--|----------------------|
| Applicant's or agent's file reference DXM/CALY5057 | FOR FURTHER ACTION | | See Form PCT/PEA/416 |
| International application No. PCT/GB2005/000569 | International filing date (day/month/year) 17.02.2005 | Priority date (day/month/year) 18.02.2004 | |
| International Patent Classification (IPC) or national classification and IPC INV. B01J31/24 C07C51/14 | | | |
| Applicant LUCITE INTERNATIONAL UK LIMITED et al. | | | |
| 1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of 6 sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. <input type="checkbox"/> sent to the applicant and to the International Bureau a total of sheets, as follows: <input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions). | | | |
| 4. This report contains indications relating to the following items: <div style="margin-left: 20px;"> <input checked="" type="checkbox"/> Box No. I Basis of the report <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input checked="" type="checkbox"/> Box No. VI Certain documents cited <input checked="" type="checkbox"/> Box No. VII Certain defects in the international application <input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application </div> | | | |
| Date of submission of the demand 08.09.2005 | Date of completion of this report 02.05.2006 | | |
| Name and mailing address of the international preliminary examining authority: <div style="display: flex; align-items: center;"> <div> European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 </div> </div> | Authorized officer Klaes, D Telephone No. +49 89 2399-7335 | | |



**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/GB2005/000569

Box No. I Basis of the report

1. With regard to the **language**, this report is based on

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-136 as originally filed

Claims, Numbers

1-37 as originally filed

Drawings, Sheets

1/3-3/3 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing *(specify)*:
- ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing *(specify)*:
- ☐ any table(s) related to sequence listing *(specify)*:

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/GB2005/000569

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|-------------|------------------------|
| Novelty (N) | Yes: Claims | 2-9, 13-15, 24 |
| | No: Claims | 1, 10-12, 16-23, 25-37 |
| Inventive step (IS) | Yes: Claims | 5-9 |
| | No: Claims | 1-4, 10-37 |
| Industrial applicability (IA) | Yes: Claims | 1-37 |
| | No: Claims | |

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

The following documents are referred to:

D2: US2002/0045748

D3: WO97/08124

D2 discloses the preparation of 5-cyanovaleric acid or its ester by carbonylation of pentennitrile in presence of a group VIII metal, a bidentate phosphine, arsine or stilbine and an acid like MSA (p. 1, column 2, paragraph [0012] - p.2, column 1, paragraph [0017]). The ratio of the catalyst components of examples 1, 2, 4-8 and A - C fall within the range of independent claim 1 (table, page 5-6).

Therefore said examples take away novelty of claims 1, 10, 11, 20-23 and 25-37 (Art. 33 (2) PCT).

The preferred molar ratios of metal to ligand according to D2 disclosed on p. 3, column 2, paragraph [0041] and p. 4, column 1, paragraph [0043] overlap with the ratios of claim 2 (M:L = 1:5). But to arrive at a ratio of M : L : Acid according to claim 2 in combination with claim 1 you have to choose from two different lists. The teaching of D2 is clearly directed to metal to ligand ratios of lower than 1 : 5.

Catalytic systems according to the present invention comprising a ratio of ligand to metal of more than 10:1 or acid to metal of more than 10:1 are not disclosed in the art.

Therefore, novelty is acknowledged for claims 2-9 (Art. 33 (3) PCT).

The applicant demonstrates that a high excess of acid improves the turnover numbers (fig. 1/3-3/3). This effect is not rendered obvious from D2.

Therefore, inventive step is acknowledged for claims 5-9 which relate to the use excess of acids (Art. 33 (3) PCT).

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/GB2005/000569

According to D2 the use of an excess of ligand is avoided due to economical reasons (p. 4, column 1, paragraph 0043). Claims 2-4 differ from the teaching of D2 only in the use of such an "uneconomical" excess of acid which does not render an inventive step obvious.

Therefore, claims 2-4 are not inventive over D2 (Art. 33 (3) PCT).

Catalytic systems according to the invention comprising ligands bearing ferrocenes (claim 14) or adamantyl or congressyl radicals (12, 13) are not disclosed in the prior art.

But as the substituent "Ad" which stands for adamantyl or congressyl radical is only an optional feature of claim 12 ("may instead be represented by the group Ad...") claims 12, 16-19 are not novel over D2 (Art. 33 (2) PCT).

D3 discloses hydroformylation reactions in presence of a catalytic systems comprising platinum, a bidentate diaryl phosphine ligand (e.g. ferrocenes; p. 2, l. 19) and an acid. To obtain ratios according to main claim 1 you have to choose from two lists on p. 5, l. 4-8. The specific examples differ from the present application in the *lower amount of acid*.

Therefore, D3 is not novelty destroying for claim 14 (relating to ferrocenes). As the applicant demonstrates that a high excess of acid improves the turnover numbers inventive step over D3 can be acknowledged for claims 13-15 (Art. 33 (3) PCT).

The teaching of claims 13-15 differ from the one of D2 in the more complex substituents of the ligands (adamantyl, congressyl, ferrocenes). The examples given in the description are only directed towards the influence of the amount of acid on the turnover numbers. As no comparative examples are included which demonstrate an effect by switching from the ligands of D2 to the more complex ligands according to claims 13-15 inventive step for said claims over D2 cannot be acknowledged (Art. 33 (3) PCT).

Claims 1-37 are industrially applicable (Art. 33 (4) PCT).

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/GB2005/000569

Re Item VI

Certain documents cited

Certain published documents

| Application No Patent No | Publication date (day/month/year) | Filing date (day/month/year) | Priority date (valid claim) (day/month/year) |
|-----------------------------|--------------------------------------|---------------------------------|---|
| WO2004/014834 | 19/02/2004 | 04/08/2003 | 10/08/2002 |

In the European Phase said document will be conflicting under Art. 53 (3) (4) EPC for claims 1-3, 7, 10, 11 and 20-37.

Re Item VII

Certain defects in the international application

In order to speed up the procedure the attention of the applicant is drawn with regard to the European Phase to the following facts:

1. The impression "incorporated by reference" on p. 85, l. 15/16 is to be deleted.
2. Claims 1, 34 and 36 are independent product claims relating essentially to the same process. In order to satisfy R. 29 (4) EPC claim 34 and 36 should depend on claim 1. The same objection applies for the independent process claims 23, 35 and 37.

Re Item VIII

Certain observations on the international application

Claims 30-33 are not clear in accordance with Art. 6 PCT and have to be deleted.